west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

December 20, 2013

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-5101689, issued to CHESAPEAKE APPALACHIA, L.L.C., is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.

James Martin
Chief

Operator's Well No: VAN ASTON MSH 206H
Farm Name: ASTON, VAN L.
API Well Number: 47-5101689
Permit Type: Horizontal 6A Well
Date Issued: 12/20/2013

Promoting a healthy environment.

API Number: 47- 051- 01689

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACOE). Through this permit, you are hereby being advised to consult with USACOE regarding this proposed activity.

2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.

3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.

4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.

5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations,* 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.

6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.

7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.

8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

51-01689

WW-6B
(9/13)

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator:	Chesapeake Appalachia, LLC	49447757	51-Marshall	1-Cameron	370- Glen Easton
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: Van Aston MSH 206H Well Pad Name: Van Aston MSH Pad

3) Farm Name/Surface Owner: Van Aston MSH Public Road Access: 17/2

4) Elevation, current ground: 1152' Elevation, proposed post-construction: 1152'

5) Well Type (a) Gas ■ Oil _____ Underground Storage _____
Other _____
(b)If Gas Shallow ✓ LKC Deep _____
Horizontal ■

JSK
10-2-2013

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Target formation- Marcellus Target top TVD- 6536' Target base TVD- 6595' Anticipated thickness- 59' Associated Pressure-4248

8) Proposed Total Vertical Depth: 6575'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 16,000'

11) Proposed Horizontal Leg Length: 7652'

12) Approximate Fresh Water Strata Depths: 307'

13) Method to Determine Fresh Water Depths: Based on analysis of nearby water wells

14) Approximate Saltwater Depths: 1200'

15) Approximate Coal Seam Depths: 770'

16) Approximate Depth to Possible Coal Seam Depths: None that we are aware of. ✓

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes ☑ No ☐

(a) If Yes, provide Mine Info: Name: McElroy
Depth: 770'
Seam: Pittsburgh
Owner: Consol Energy

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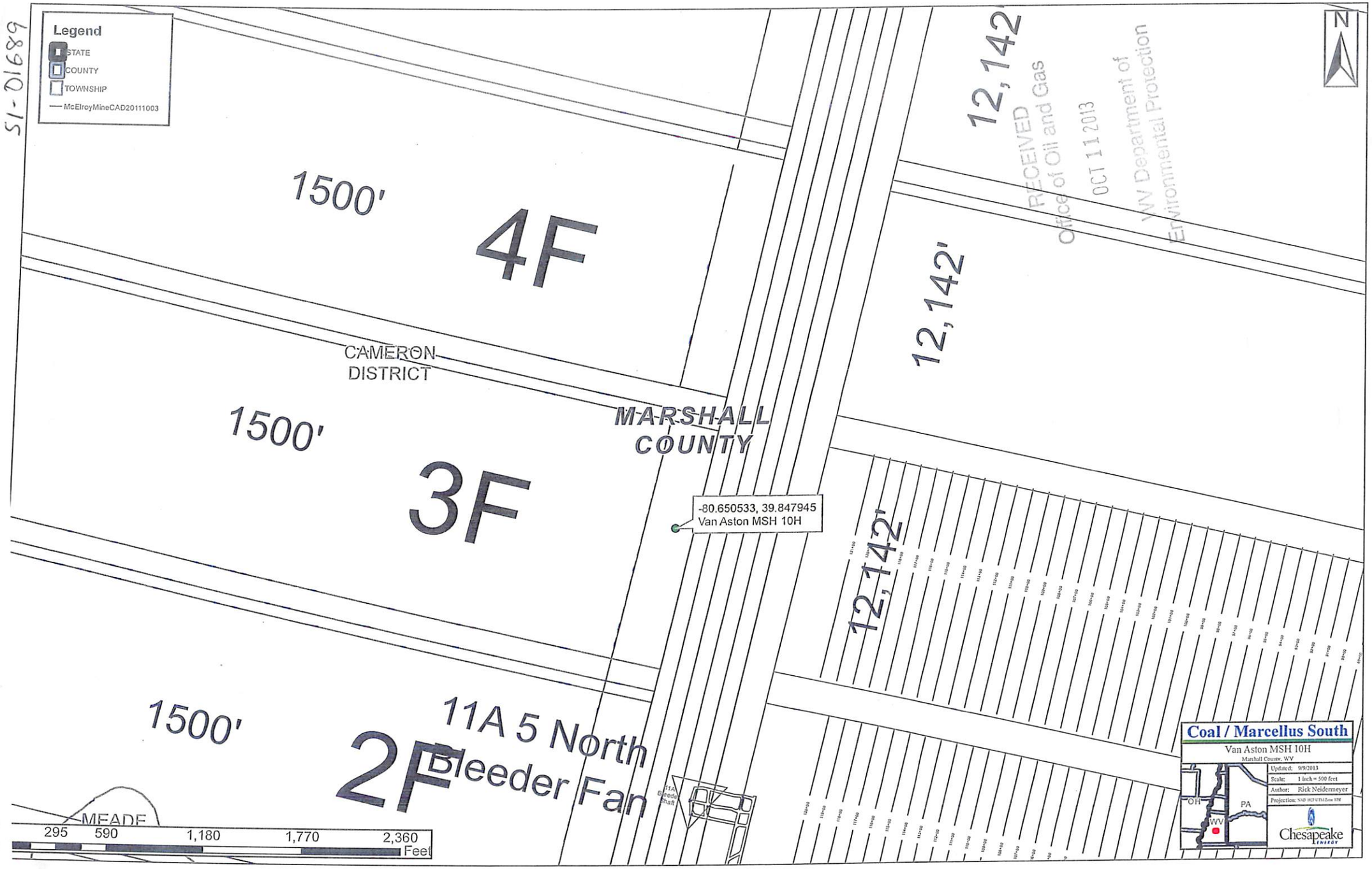

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18) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20"	New	J-55	94#	100'	100'	CTS
Fresh Water	13 3/8"	New	J-55	54.5#	407'	407'	390 sx/CTS
Coal	9 5/8"	New	J-55	40#	2,220'	2,220'	850 sx/CTS
Intermediate	7"	New	P-110	20#	If Needed	If Needed	If needed/As Needed
Production	5 1/2"	New	P-110	20#	16,000'	16,000'	Lead 1230sx Tail 1530sx/100' inside
Tubing	2 3/8"	New	N-80	4.7#	Approx. 7640'	Approx. 7640'	
Liners							

MDK 10-2-2013 10-2-13

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	30"	0.25	2120	15.6 ppg	1.19/50% Excess
Fresh Water	13 3/8"	17.5"	0.380	2740	15.6 ppg	1.19/50% Excess
Coal	9 5/8"	12 1/4"	0.395	3950	15.6 ppg	1.19/50% Excess
Intermediate	7"	8 3/4"	0.317	4360	15.6 ppg	1.20/15% Excess
Production	5 1/2"	8 3/4"	0.361	12360	15.6 ppg	1.20/15% Excess
Tubing	2 3/8"	4.778"	0.190			
Liners						

PACKERS

Kind:	10K Arrowset AS1-X			
Sizes:	5 1/2"			
Depths Set:	Approx. 6,197'			

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19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill and stimulate any potential zones between and including the Benson to the Marcellus. **If we should encounter a void, place basket above and below void area - balance cement to bottom of void and grout from basket to surface. Run casing not less than 20' below void nor more than 50' below void. (*If freshwater is encountered deeper than anticipated it must be protected, set casing 50' below and cts)

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Well will be perforated within the target formation and stimulated with a slurry of water, sand, and chemical additives at a high rate. This will be performed in stages with the plug and perf method along the wellbore until the entire lateral has been stimulated within the target formation. All stage plugs are then drilled out and the well is flowed back to surface. The well is produced through surface facilities consisting of high pressure production units, vertical separation units, water and oil storage tanks. Max press and anticipated max rate-9000 lbs @ 80 barrells a minute.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 9.50

22) Area to be disturbed for well pad only, less access road (acres): 5.48

23) Describe centralizer placement for each casing string:

All casing strings will be ran with a centralizer at a minimum of 1 per every 3 joints of casing.

24) Describe all cement additives associated with each cement type:

**Please see attached sheets for Chemical Listing of Cement & Additives for Chesapeake Energy wells.

25) Proposed borehole conditioning procedures:

All boreholes will be conditioned with circulation and rotation for a minimum of one bottoms up and continuing until operator is satisfied with borehole conditions.

*Note: Attach additional sheets as needed.

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SLB Cement Additives

	Product Name	Product Use
Surface	D046	antifoam
	D130	polyester flake - lcm
	S001	calcium chloride
	SPACER	
	D130	polyester flake - lcm
	D020	bentonite extender
Intermediate	D046	antifoam
	D130	polyester flake - lcm
	D044	granulated salt
	D153	Anti-Settling Agent
	SPACER	
	D020	bentonite extender
	D130	polyester flake - lcm
Kick Off Plug	D080	cement liquid dispersant
	D801	mid-temp retarder
	D047	antifoam agent
	SPACER	
	B389	MUDPUSH* Express
	D206	Antifoaming Agent
	D031	barite
	B220	surfactant
Production - Lead	D167	UNIFLAC* S
	D154	low-temperature extender
	D400	EasyBLOK
	D046	antifoam
	D201	basic cements enabler
	D202	low-temperature solid dispersant
	D046	antifoam
	D167	UNIFLAC* S
	D065	TIC* Dispersant

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D201	basic cements enabler
D153	Anti-Settling Agent
SPACER	
B389	MUDPUSH* Express
D206	Antifoaming Agent
D031	barite
B220	surfactant

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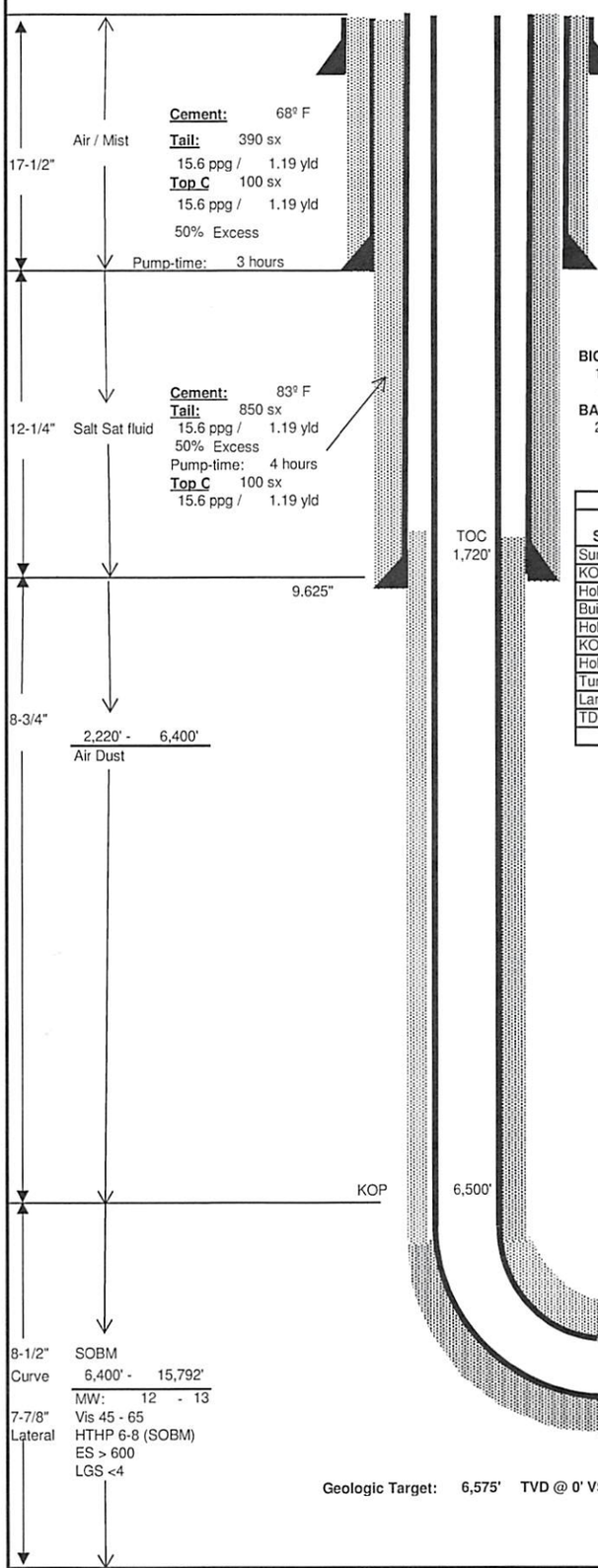
Chesapeake ENERGY

Well Name:	**Van Aston MSH 206H**			**Drilling Rig:**	**N/A**
				Directional Drilling:	N/A
Drilling Engineer:	TBD	**Formation:**	Marcellus	**Drilling Mud:**	N/A
Superintendent:	N/A	**County, State:**	Marshall, WV	**Cement Surface:**	N/A
Asset Manager:	N/A	**Surface Latitude:**	39.847938	**Surface Longitude:** -80.650582	**Cement Longstrings:** N/A
Geologist:	N/A	**BH Latitude:**	39.824625	**BH Longitude:** -80.647236	**Wellhead:** N/A
Land:	N/A	**KB Elevation:**	1172'	**Ground Elevation:** 1152'	AFE #: N/A



Wellhead Equipment	
Tree Description	
Tubing Head **	Blanking Cap
'B' Section	11" x 5M x 7-1/16" 10M
'A' Section	9-5/8" SOW x 11" 5M

** Space out such that Blanking Cap is no more than 30" above grade.

Casing Detail						
	Size	Wt	Grd	Conn.	From:	To:
Surface	13.375	54.5 #	J-55	STC	0'	407'
Interm	9.625	40 #	J-55	LTC	0'	2,220'
Prod	5.5	20 #	P-110	GBCD	0'	15,792'

Report any water or gas flows. Catch liquid sample if possible.

Casing Design						
	Size	ID	Coll	Burst	Tens	MU torq
Surface	13.375	12.615	1130	2740	514	5140
Interm	9.625	8.835	2570	3950	520	5200
Prod	5.5	4.778	12200	12360	641	8530

Directional Drilling Details

Section	TMD	Inc.	Azimuth	TVD	BUR	DLS	+N/-S	+E/-W
Surface	0.00'	0.00	0.00	0.00'	0.00	0.00	0.0'	0.0'
KOP1	950'	0.00	0.00	950'	0.00	0.00	0.0'	0.0'
Hold	1,450'	10.00	250.00	1,447'	2.00	2.00	-14.9'	-40.9'
Build	2,300'	10.00	250.00	2,285'	0.00	0.00	-65.4'	-179.6'
Hold	3,050'	25.00	250.00	2,998'	2.00	2.00	-142.3'	-390.9'
KOP2	6,500'	25.00	250.00	6,125'	0.00	0.00	-641.0'	-1,761.0'
Hold	6,898'	68.77	220.68	6,393'	10.99	12.00	-821.1'	-1,973.6'
Turn	7,093'	68.77	220.68	6,464'	0.00	0.00	-959.0'	-2,092.1'
Landing pt	7,640'	90.00	157.00	6,575'	3.88	12.00	-1,459.6'	-2,158.8'
TD	15,792'	90.00	157.00	6,575'	0.00	0.00	-8,963.3'	1,026.3'
	VS Plane	157.00				VS Length	8,651.82'	
						Lateral Length ==>	8,698.30'	

Plat Date	6/7/13

Logging Program

Run	Log Type	Interval
1	TBD	TBD
2	TBD	TBD
Mudlogger operational at	Surface	

Formation Depths (TVD)

BASE BIG INJUN	2,061'
GENESEO	6,392'
TULLY	6,420'
HAMILTON	6,440'
MARCELLUS	6,536'
ONONDAGA	6,595'

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Cement: 121° F
Lead: 1,230 sx
15.6 ppg / 1.20 yld
Tail: 1,530 sx
15.6 ppg / 1.20 yld
15% Excess
Pump-time: 6 hours

Geologic Target: 6,575' **TVD @ 0' VS w/** 0.00 **degrees/100 ft** **Up-dip**

PBHL 5.5"
TMD: 15,792'
TVD: 6,575'
Inclination: 90.00 deg

Gyro the 1st well on the pad at KOP.
Ensure all Surveys are referenced to Grid North!!

Drawn by: **TBD**
Date: 9/30/2013

WW-9
(9/13)

API Number 47 - 51 - 01689
Operator's Well No. Van Aston MSH 206H

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Chesapeake Appalachia, LLC OP Code 49447757

Watershed (HUC 10) Middle Grave Creek/Grave Creek Quadrangle 370- Glen Easton

Elevation 1,152' County 51-Marshall District 1-Cameron

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes ☑ No ☐

Will a pit be used? Yes ☐ No ☑

If so, please describe anticipated pit waste: Closed loop system in place at this time- cuttings will be taken to a permitted landfill.

Will a synthetic liner be used in the pit? Yes ☐ No ☑ If so, what ml.?

Proposed Disposal Method For Treated Pit Wastes:

- ☐ Land Application
- ■ Underground Injection (UIC Permit Number 2D0072539/ 2D0413175/ 2D0610306/ 2D0610317)
- ■ Reuse (at API Number at next anticipated well, API# will be included with the WR-34/DDMR &/or permit addendum.)
- ☐ Off Site Disposal (Supply form WW-9 for disposal location)
- ■ Other (Explain Flow back fluids will be put in steel tanks and reused or taken to a permitted disposal facility.

Will closed loop system be used? If so, describe: Yes

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air and salt saturate mud

-If oil based, what type? Synthetic, petroleum, etc. Synthetic Oil Base

Additives to be used in drilling medium? see attached sheets

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust)

-Landfill or offsite name/permit number? Meadowfill SWF-1032, SS Grading SWF-4902, Northwestern SWF-1025, Short Creek 1034/WV0109517/CID28726, Carbon Limestone 28726/CID 28726
Arden Landfill 100172, American 02-12954, Country Wide 38390/CID 38390, Pine Grove 13688

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

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Company Official Signature

Company Official (Typed Name) Danielle Southall

Company Official Title Regulatory Analyst

Subscribed and sworn before me this 30th day of September, 2013

Brittany R Woody Notary Public

My commission expires 11/27/22

OFFICIAL SEAL
Notary Public, State of West Virginia
BRITTANY R WOODY
3302 Old Elkins Road
Buckhannon, WV 26201
My commission expires November 27, 2022

SI-01689

Form WW-9

Operator's Well No. Van Aston MSH 206H

Chesapeake Appalachia, LLC

Proposed Revegetation Treatment: Acres Disturbed 10 +/- Prevegetation pH _____

Lime _____ (as determined by pH test min. 2) Tons/acre or to correct to pH 6.5

Fertilizer type _____

Fertilizer amount 500 lbs/acre

Mulch Hay/Straw 2.5 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
White Clover	15	White Clover	15
Red Top	15	Red Top	15
Orchard Grass	20	Orchard Grass	20

Attach:
Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Wayne J Kuth Jim Nicholson

Comments: _____

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Environmental Protection

Title: Oil and Gas Inspector Date: 10/2/2013

Field Reviewed? (☒) Yes (☐) No

Water Management Plan:
Primary Water Sources

WMP- 01602	API/ID Number:	047-051-01689	Operator:	Chesapeake Energy

Van Aston MSH 206H - 839104

Important:

For each proposed primary water source (including source intakes for purchased water sources) identified in your water management plan, and summarized herein, DEP has made an evaluation concerning water availability over the specified date range. DEP's assessment is based on the following considerations:

- Statistical analysis of historical USGS stream gauge data (transferred to un-gauged locations as necessary);
- Identification of sensitive aquatic life (endangered species, mussels, etc.);
- Quantification of known existing demands on the water supply (Large Quantity Users);
- Minimum flows required by the Army Corps of Engineers; and
- Designated stream uses.

Based on these factors, DEP has provided, for each intake location (and origination point for purchased water), a reference gauge location and discharge flow reading which must be surpassed prior to withdrawals. Additionally, DEP has established a minimum passby flow at the withdrawal location which must also be surpassed prior to withdrawals. These thresholds are considered terms of the permit and are enforceable as such.

DEP is aware that some intake points will be used for mutiple wells and well sites. In these cases, the thresholds set by the Water Management Plan are to be interepreted as total withdrawal limits for each location over the specified date range regardless of how many wells are supported by that intake.

For all purchased water intakes, determinations of water availability are made at the original source intake location. It is the responsibility of the Oil and Gas Operator, not the seller, to cease withdrawal of water from the seller when flows are less than the minimum gauge reading at the stream gauge referenced by the Water Management Plan in order to protect stream uses.

Note that the determinations made herein are based on the best available data, but it is impossible to predict water availability in the future. While the DEP has carefully established these minimum withdrawal thresholds, it remains the operator's responsibility to protect aquatic life at all times. Approval to withdrawal is contingent upon permission from the land owner. It is the responsibility of the operator to secure and maintain permission prior to any withdrawals.

The operator is reminded that 24-48 hours prior to withdrawing (or purchasing) water, DEP must be notified by email at DEP.water.use@wv.gov.

APPROVED NOV 22 2013

Source Summary

WMP- **01602** API Number: **047-051-01689** Operator: **Chesapeake Energy**

Van Aston MSH 206H - 839104

Stream/River

◉ Source **Ohio River WP 1 (Beech Bottom Staging Area)** **Brooke** Owner: **Brownlee Land Ventures**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
12/1/2013	12/1/2014	7,098,000		40.226889	-80.658972

☑ Regulated Stream? **Ohio River Min. Flow** Ref. Gauge ID: **9999999** **Ohio River Station: Willow Island Lock & Dam**

Max. Pump rate (gpm): 6,000 **Min. Gauge Reading (cfs): 6,468.00** **Min. Passby (cfs)**

DEP Comments: **Refer to the specified station on the National Weather Service's Ohio River forecast website: http://www.erh.noaa.gov/ohrfc//flows.shtml**

◉ Source **Little Wheeling Creek WP 1 (Rt. 40 Staging Area)** **Ohio** Owner: **JDS Investments, LLC**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
12/1/2013	12/1/2014	7,098,000		40.078324	-80.591145

☐ Regulated Stream? Ref. Gauge ID: **3112000** **WHEELING CREEK AT ELM GROVE, WV**

Max. Pump rate (gpm): 2,000 **Min. Gauge Reading (cfs): 64.80** **Min. Passby (cfs) 2.83**

DEP Comments:

Source Summary

WMP-01602 | API Number: 047-051-01689 | Operator: Chesapeake Energy

Van Aston MSH 206H - 839104

Purchased Water

- Source **Ohio River @ J&R Excavating** Marshall Owner: **J&R Excavating**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
12/1/2013	12/1/2014	7,098,000	1,890,000	39.998509	-80.737336

☑ Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: http://www.erh.noaa.gov/ohrfc//flows.shtml

- Source **The Village of Valley Grove** Ohio Owner: **The Village of Valley Grove**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
12/1/2013	12/1/2014	7,098,000	720,000	-	-

☑ Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: http://www.erh.noaa.gov/ohrfc//flows.shtml

- Source **Ohio County PSD** Ohio Owner: **Ohio county PSD**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
12/1/2013	12/1/2014	7,098,000	720,000	-	-

☑ Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: http://www.erh.noaa.gov/ohrfc//flows.shtml

Source Detail

WMP-01602 | API/ID Number: 047-051-01689 | Operator: Chesapeake Energy

Van Aston MSH 206H - 839104

Source ID: 30202 | Source Name: Ohio River @ J&R Excavating / J&R Excavating

Source Latitude: 39.998509

Source Longitude: -80.737336

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 | County: Marshall

Anticipated withdrawal start date: 12/1/2013

Anticipated withdrawal end date: 12/1/2014

Total Volume from Source (gal): 7,098,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm)

- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Ohio River Min. Flow
- [ ] Proximate PSD?
- [x] Gauged Stream?

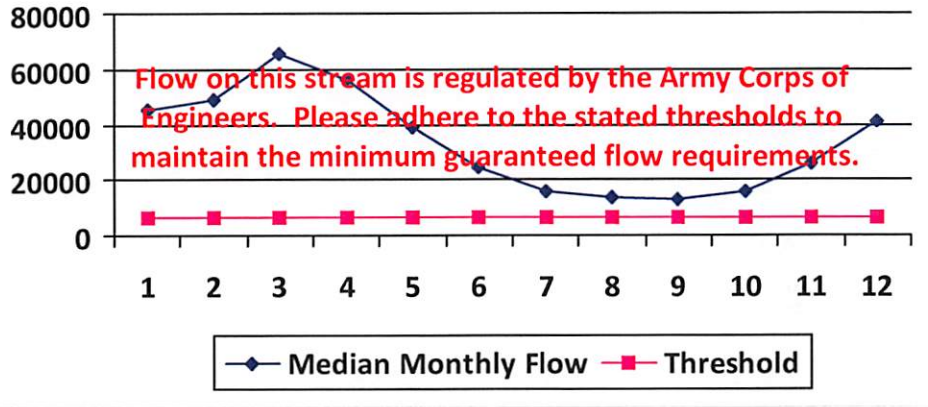
Reference Gaug: 9999999 | Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP- 01602 | API/ID Number: 047-051-01689 | Operator: Chesapeake Energy

Van Aston MSH 206H - 839104

Source ID: 30203 | Source Name: The Village of Valley Grove / The Village of Valley Grove

Source Latitude: -

Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 | County: Ohio

Anticipated withdrawal start date: 12/1/2013

Anticipated withdrawal end date: 12/1/2014

Total Volume from Source (gal): 7,098,000

- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Ohio River Min. Flow
- [x] Proximate PSD? — Wheeling Water Department
- [x] Gauged Stream?

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

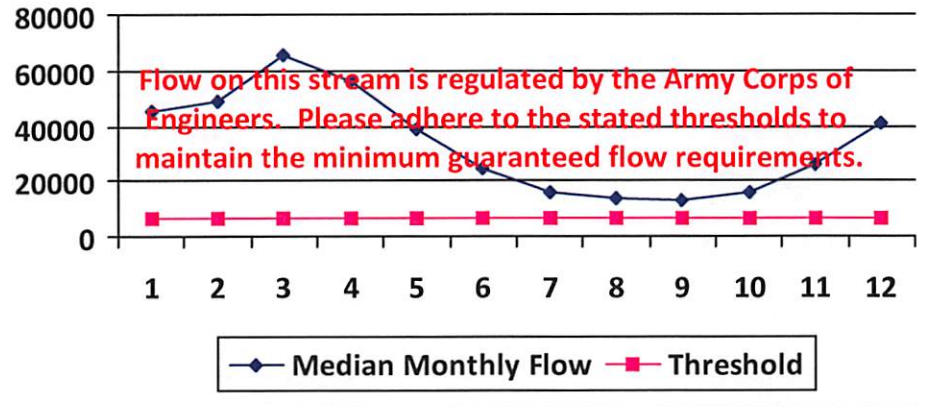
Max. Truck pump rate (gpm)

Reference Gaug: 9999999 | Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00 | Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs):

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 0.00

Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP- 01602 | API/ID Number: 047-051-01689 | Operator: Chesapeake Energy

Van Aston MSH 206H - 839104

Source ID: 30204 | Source Name: Ohio County PSD / Ohio county PSD | Source Latitude: - | Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 | County: Ohio

Anticipated withdrawal start date: 12/1/2013

Anticipated withdrawal end date: 12/1/2014

Total Volume from Source (gal): 7,098,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

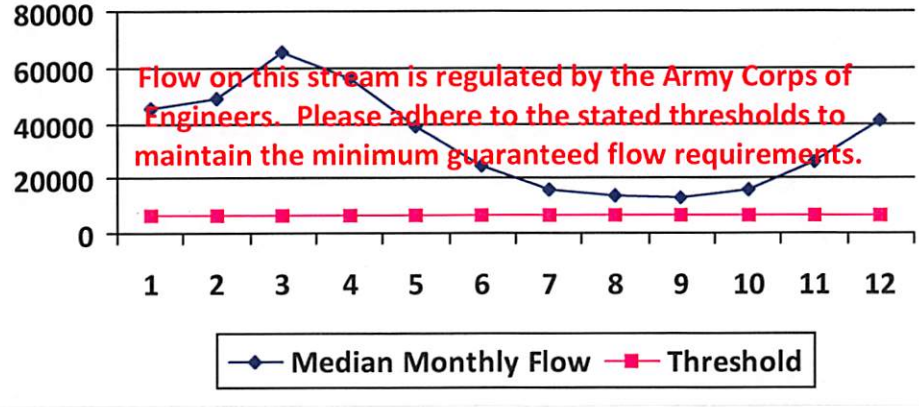
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Ohio River Min. Flow
- [x] Proximate PSD? — Wheeling Water Department
- [x] Gauged Stream?

Reference Gaug: 9999999 — Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00 | Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	
Downstream Demand (cfs):	
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP- 01602 | API/ID Number: 047-051-01689 | Operator: Chesapeake Energy

Van Aston MSH 206H - 839104

Source ID: 30200 | Source Name: Ohio River WP 1 (Beech Bottom Staging Area)

Brownlee Land Ventures

Source Latitude: 40.226889

Source Longitude: -80.658972

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 | County: Brooke

Anticipated withdrawal start date: 12/1/2013

Anticipated withdrawal end date: 12/1/2014

Total Volume from Source (gal): 7,098,000

- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Ohio River Min. Flow
- [x] Proximate PSD? — Beech Bottom Water Dept.
- [x] Gauged Stream?

Max. Pump rate (gpm): 6,000

Max. Simultaneous Trucks: 0

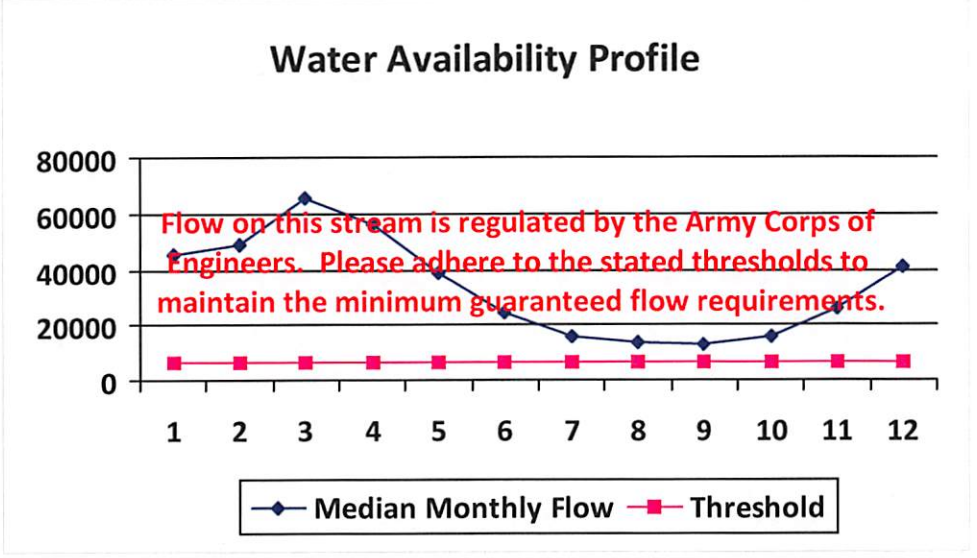
Max. Truck pump rate (gpm) 0

Reference Gaug: 9999999 | Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	
Downstream Demand (cfs):	
Pump rate (cfs):	13.37
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP- 01602 | API/ID Number: 047-051-01689 | Operator: Chesapeake Energy

Van Aston MSH 206H - 839104

Source ID: 30201 | Source Name: Little Wheeling Creek WP 1 (Rt. 40 Staging Area)

JDS Investments, LLC

Source Latitude: 40.078324

Source Longitude: -80.591145

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 13.94 | County: Ohio

Anticipated withdrawal start date: 12/1/2013

Anticipated withdrawal end date: 12/1/2014

Total Volume from Source (gal): 7,098,000

Max. Pump rate (gpm): 2,000

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

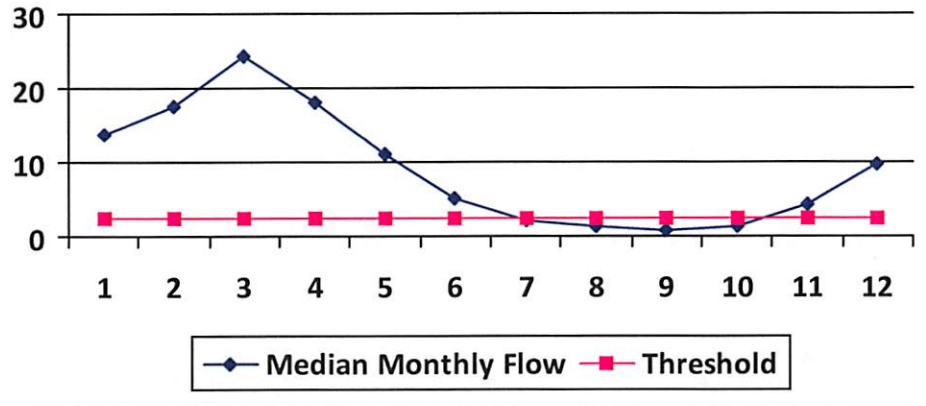
Reference Gaug: 3112000 WHEELING CREEK AT ELM GROVE, WV

Drainage Area (sq. mi.): 281.00

Gauge Threshold (cfs): 38

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	13.81	10.62	3.55
2	17.62	10.62	7.36
3	24.44	10.62	14.18
4	18.14	10.62	7.88
5	11.06	10.62	0.80
6	5.03	10.62	-5.23
7	2.22	10.62	-8.03
8	1.30	10.62	-8.96
9	0.83	10.62	-9.43
10	1.37	10.62	-8.89
11	4.31	10.62	-5.95
12	9.77	10.62	-0.49

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	1.89
Upstream Demand (cfs):	3.34
Downstream Demand (cfs):	0.00
Pump rate (cfs):	4.46
Headwater Safety (cfs):	0.47
Ungauged Stream Safety (cfs):	0.47
Min. Gauge Reading (cfs):	**64.80**
Passby at Location (cfs):	**2.83**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Water Management Plan:
Secondary Water Sources

WMP-01602 | API/ID Number 047-051-01689 | Operator: Chesapeake Energy

Van Aston MSH 206H - 839104

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Multi-site impoundment

Source ID: 30216 Source Name: Columbia Gas Transmission (TCO Elson) FWI

Source start date: 12/1/2013

Source end date: 12/1/2014

Source Lat: 39.75398 Source Long: -80.613604 County: Marshall

Max. Daily Purchase (gal):

Total Volume from Source (gal): 7,098,000

DEP Comments:

The intake identified above has been defined in a previous water management plan. The thresholds established in that plan govern this water management plan unless otherwise noted.

Reference: WMP-547

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Purchased Water

Source ID: 30205 Source Name: Pennsylvania American Water
Public Water Provider
Source start date: 12/1/2013
Source end date: 12/1/2014
Source Lat: Source Long: County
Max. Daily Purchase (gal): 720,000 Total Volume from Source (gal): 7,098,000
DEP Comments: Please ensure that the sourcing of this water confirms to all rules and guidance provided by PA DEP.

Source ID: 30206 Source Name: Elite Gasfield Services, Midland Borough
Commercial Supplier
Source start date: 12/1/2013
Source end date: 12/1/2014
Source Lat: 40.644598 Source Long: -80.469382 County
Max. Daily Purchase (gal): 8,640,000 Total Volume from Source (gal): 7,098,000
DEP Comments: Please ensure that the sourcing of this water confirms to all rules and guidance provided by PA DEP.

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Recycled Frac Water

Source ID: 30218 Source Name: Various

Source start date: 12/1/2013
Source end date: 12/1/2014

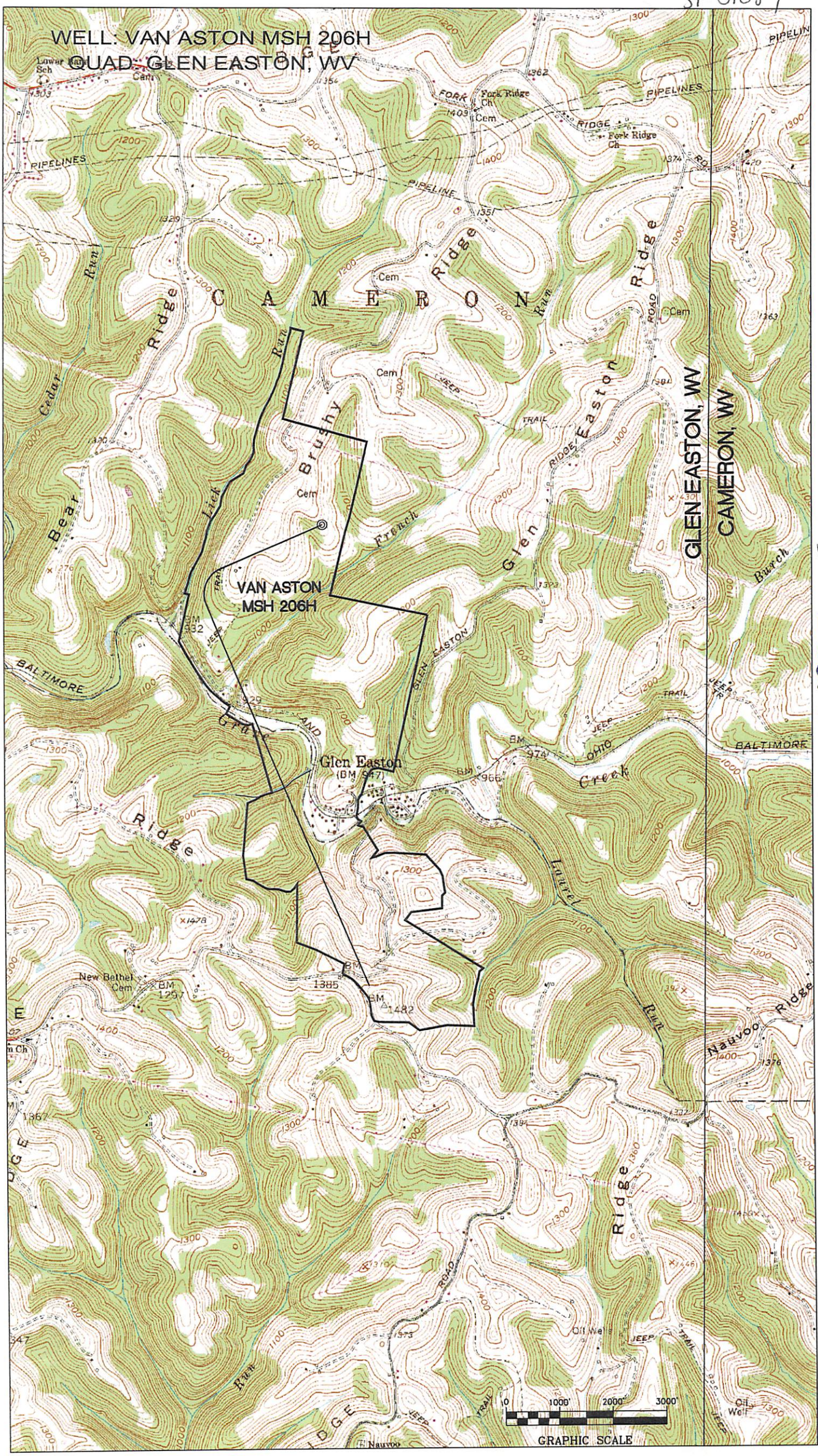
Source Lat: Source Long: County:

Max. Daily Purchase (gal): Total Volume from Source (gal): 7,098,000

DEP Comments: Sources include, but are not limited to, Roy Ferrell OHI 205H

SI-01689

WELL: VAN ASTON MSH 206H
QUAD: GLEN EASTON, WV



BJK
10-2-18

SURFACE HOLE DEC. LONG: 80.650582
SURVEYED LONG: 80° 39' 02.1"

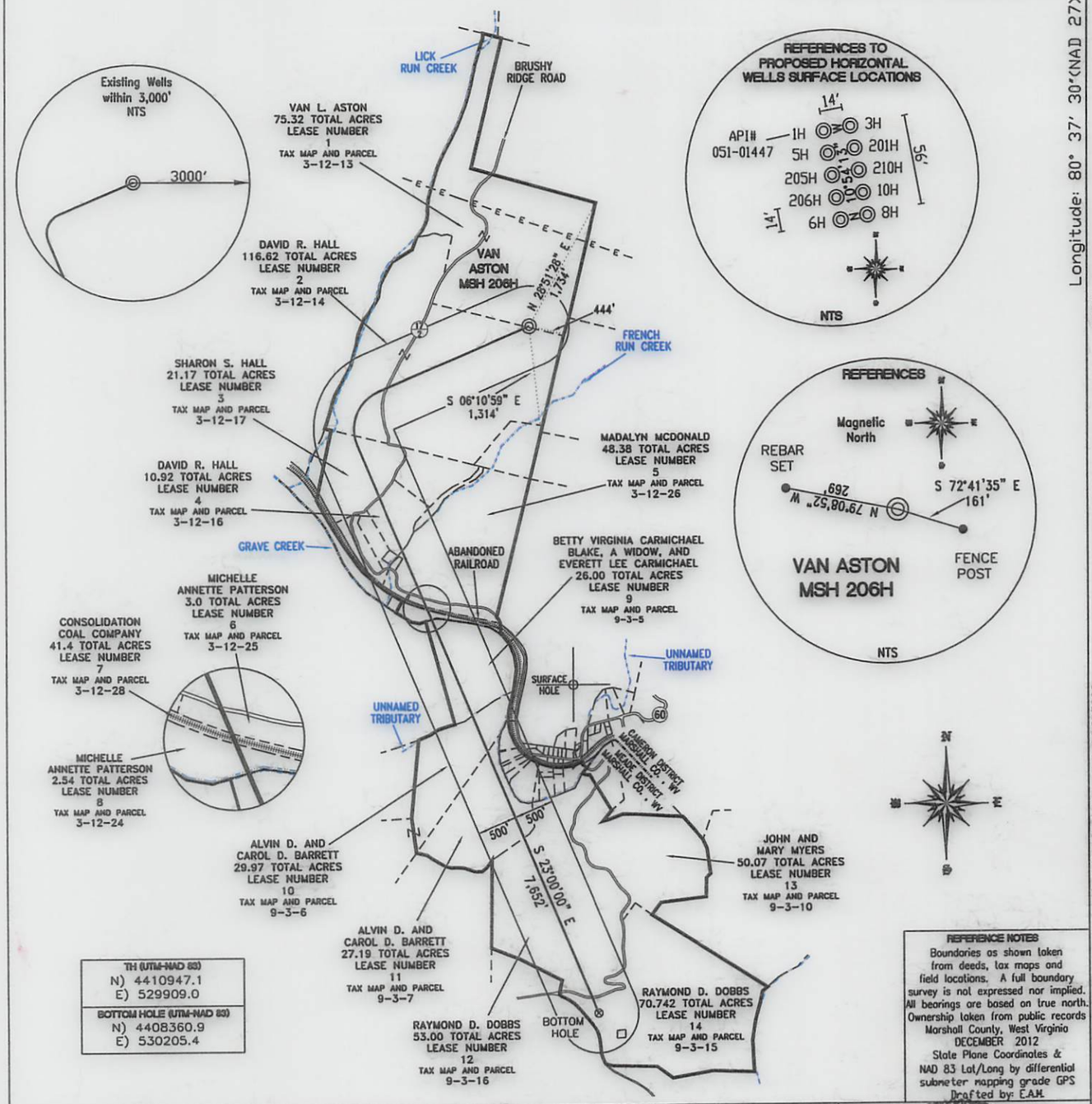
7,150'

Latitude: 39° 52' 30"(NAD 27)

Longitude: 80° 37' 30"(NAD 27)

9,840'

SURFACE HOLE DEC. LAT: 39.847938
SURVEYED LAT: 39° 50' 52.6"



REFERENCE NOTES

Boundaries as shown taken from deeds, tax maps and field locations. A full boundary survey is not expressed nor implied. All bearings are based on true north. Ownership taken from public records Marshall County, West Virginia DECEMBER 2012 State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS Drafted by: E.A.H.

FILE #: CHE 032
DRAWING #: 2190
SCALE: PLAT - 1" = 1800' TICK MARK - 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1/200
PROVEN SOURCE OF ELEVATION: SUBMETER MAPPING GRADE GPS

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: _____

L.L.S. #2124 : Ernest J. Benchek III

ERNEST J. BENCHEK III LICENSED No. 2124 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: SEPTEMBER 18, 2013

OPERATOR'S WELL #: VAN ASTON MSH 206H

API WELL #: 47 (STATE) 51 (COUNTY) 01689 H6A (PERMIT)

Well Type: ☐ Oil ☐ Waste Diposal ☐ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: MIDDLE GRAVE CREEK-GRAVE CREEK ELEVATION: 1,152'

COUNTY/DISTRICT: MARSHALL / CAMERON QUADRANGLE: GLEN EASTON, WV.

SURFACE OWNER: VAN L. ASTON ACREAGE: 75.32 +/-

OIL & GAS ROYALTY OWNER: VAN L. ASTON ACREAGE: 526.252 +/-

LEASE NUMBERS: _____

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒
PLUG OFF FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐
CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,575' TMD: 15,792'

WELL OPERATOR: CHESAPEAKE APPALACHIA, LLC. DESIGNATED AGENT: ERIC GILLESPIE

ADDRESS: PO BOX 18496 ADDRESS: PO BOX 6070

CITY: OKLAHOMA CITY STATE: OK ZIP CODE: 73154-0496 CITY: CHARLESTON STATE: WV ZIP CODE: 25362